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Analysis and Strategy of AI Ethical Problems

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Abstract

Artificial intelligence (AI) is the core of the fourth industrial revolution, and it has brought challenges to ethics and social governance. On the basis of explaining the current ethical risks of artificial intelligence, the study furtherly analyzes the current consensus on ethics, governance principles, and governance approaches of artificial intelligence. Moreover, the study also proposes to take "co-construction, co-governance and sharing" as the guiding theory to gradually build a multi-dimensional ethical governance system, including education reform, ethical norms, technical supports, legal regulations, and international cooperation.

Keywords

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Analysis and Strategy of AI Ethical Problems

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Abstract: Artificial intelligence (AI) is the core of the fourth industrial revolution, and it has brought challenges to ethics and social governance. On the basis of explaining the current ethical risks of artificial intelligence, the study furtherly analyzes the current consensus on ethics, governance principles, and governance approaches of artificial intelligence. Moreover, the study also proposes to take "co-construction, co-governance and sharing" as the guiding theory to gradually build a multi-dimensional ethical governance system, including education reform, ethical norms, technical supports, legal regulations, and international cooperation. **DOI:** 10.16418/j.issn.1000-3045. 20210604002-en

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Artificial intelligence (AI) is the core technology of the fourth industrial revolution, which has been highly valued by countries worldwide. China has also made a series of development plans and strategies to vigorously promote AI development. AI technology, however, not only brings great opportunities for economic development and social progress but also brings challenges to ethics and public security. In 2017, the *New Generation Artificial Intelligence Development Plan* [1] issued by the State Council presented the strategic goal of "three steps," stirring up an AI boom. Meanwhile, the *Plan* also explicitly stipulated that China should strengthen research on AI-related legal, ethical and social issues and build a legal, regulatory and ethical framework to ensure the healthy development of AI. In 2018, while presiding over the group study session held by the Political Bureau of the CPC Central Committee on the AI development status and trend, General Secretary XI Jinping stressed that we should strengthen the study and prevention of potential risks of the AI development, maintain people's interests and national security, and ensure the safe, reliable and controllable AI. Efforts should be made to integrate multidisciplinary strength, conduct detailed research on AI-related legal, ethical and social issues, and establish sound laws and regulations, systems and ethics to ensure the healthy development of AI. In 2019, the Promotion Office of the New Generation Artificial Intelligence Development Plan in China set up the National Governance Committee for the New Generation Artificial Intelligence to study and promote the work of policy systems, laws and regulations, and ethical norms of AI governance. The *Outline of the 14th Five-Year Plan for Economic and Social Development and Long-term Objectives through the Year 2035 of the People's Republic of China* specifically emphasizes that China should "explore to establish regulatory frameworks for automated driving, online healthcare, financial technology, intelligent distribution, and other aspects and improve relevant laws and regulations and ethical review rules" [2]. All these reflect China's close attention to AI ethical problems and their governance and the resolution to actively promote the work, and also highlight the importance of this issue.

1 Current AI ethical problems

Ethics is the principle and order norms for dealing with relations between people and between people and society. In human history, major scientific and technological development often causes evident changes in productive forces, productive relations, and the superstructure and becomes an important criterion for dividing the age, while it also brings people's profound reflection on social ethics. Since human society entered the information age in the mid to late 20th century, information technology ethics has gradually received widespread attention and been extensively studied, including personal information leakage, information gap, information cocoons, and inadequate regulation of new power

structure [1]. With the rapid development of information technology, human society is quickly moving toward the intelligent era, when AI algorithms possessing cognition, prediction, and decision-making functions are increasingly widely used in various social scenarios. With the comprehensive application of cutting-edge information technologies, a new hardware and data resource network that everything is connected and computed is gradually formed, which can provide massive multi-source heterogeneous data for AI algorithms to analyze and process. AI algorithms can directly control physical devices and provide auxiliary support for personal, group, and even national decision-making. Moreover, AI can be used in various scenarios such as smart home, smart transportation, smart medical, smart factory, smart agriculture, and smart finance, and it may also be used for weapons and the military. Nevertheless, we are moving forward the intelligent era so rapidly that we urgently need to deal with more challenging AI ethical problems and actively build the order of the intelligent society, under the circumstance that the traditional ethical order of information technology has not been established yet [2].

Moore [3], founder of computer ethics, divided the ethical agent into four categories: 1) ethical-impact agents (having an ethical impact on society and the environment); 2) implicit ethical agents (implicit ethical design such as specific hardware and software with safety built-in); 3) explicit ethical agents (taking reasonable actions according to the changes of circumstances and the understanding of ethical norms); 4) full ethical agents (having free will like humans and making ethical decisions in various circumstances). AI still has a certain ethical effect on society and environment, though in its weak AI stage. People are exploring the possibilities of building ethical rules in AI and including the understanding of ethical rules in AI technology by ethical reasoning and other ways. In recent years, there are an increasing number of calls for the moral subject status of AI machines, but whether machines can become full ethical agents has caused considerable controversy [4]. Despite similar functions or behaviors of AI to humans in certain scenarios, it doesn't have "free will." In terms of the classic social norm theory, whether AI can become a "subject" in the normative sense to bear the responsibility does not depend on its functions, but the "free will." The *Elements of the Philosophy of Right* written by Hegel started with free will. Therefore, the analysis and solution approaches of AI ethical problems at the present stage should be constructed for the first three categories of ethical agents, that is, AI is defined as a tool rather than a subject.

Currently, AI not only inherits the ethical problems of previous information technologies, but also has new characteristics due to the lack of transparency, inexplicability, adaptability, wide application, and other characteristics of deep learning and other AI algorithms. Consequently, those factors may bring a series of ethical risks in such aspects as basic human rights, social order, and national security. Here are some examples. 1) The defects and value-setting problems of AI systems may pose threats to citizens' rights to life and health. In 2018, an Uber autonomous vehicle had a fatal accident in Arizona, which was not caused by faulty sensors, but by Uber's decision to ignore leaves, plastic bags, and other obstacles identified by AI algorithms for sake of passenger comfort in system design. 2) AI algorithms may bring or expand discrimination in society and violate citizens' right of equality due to errors in target demonstration, algorithmic discrimination, and data training. 3) The AI abuse may threaten citizens' rights of privacy and personal information. 4) Deep learning and other complex AI algorithms will lead to the black box problem that causes opacity of decisions or difficulty in interpretation, thereby affecting citizens' right to know, due process, and citizens' right of supervision. 5) The abuse and misuse of AI technology such as accurate information push, automated writing of fake news, intelligent targeted communication, and deepfake may inflict information cocoons, false information overload, and other problems, and may affect people's access to important news and democratic participation in public issues. The accurate push of fake news may further influence people's knowledge and opinions on facts, which may incite public opinions, manipulate commercial markets, and affect political and national policies. For example, Cambridge Analytica LLC (CA) analyzed the political preferences of users by data from Facebook and pushed information on a precise targeting basis to influence the US election. 6) AI algorithms may destroy the market competition environment by algorithm discrimination, or by forming a horizontal monopoly agreement or hub-and-spoke agreement through algorithm collusion, under the circumstances hard to be detected or proven. 7) The application of algorithm decision-making in various social fields may cause changes in the power structure. With the advantages of processing massive data and being embedded in ubiquitous information systems, algorithms have a significant impact on people's rights, interests, and freedoms [5]. For example, credit rating by algorithms in bank credit will affect citizens' access to loans, and social risk assessments by algorithms in criminal justice will determine the need for pretrial detention. 8) The AI abuse in work scenes may influence laborer rights and interests, and the replacement of workers by AI may incur a crisis of large-scale structural unemployment and pose risks to the right of labor or job opportunities. 9) With the extensive use of AI in various links of social production and life, security risks of AI system, such as the bugs and design defects, may lead to data (e.g., personal information) leakage, cessation of the industrial production line, traffic paralysis, and other social problems, thereby threatening financial, social and national security. 10) The abuse of AI weapons may intensify inequality and threaten human life and world peace.

The governance of AI ethical risks is complex and the perfect theoretical framework and governance system have not been formed. 1) There are diverse causes for AI ethical risks, including the anomie of the goal of AI algorithms,

defects of the system and algorithms, the crisis of confidence of AI by affected subjects, the lack of supervision mechanism and tools, imperfect responsibility mechanism, and weak defenses of affected subjects [6]. 2) AI technology and industrial applications are developing so rapidly that it is difficult to fully describe and analyze its ethical risks and provide solutions. Therefore, we should resolve the lag of the traditional normative system, ponder on and set up normative frameworks for the AI design, R&D, application, and utilization with future-oriented perspective and methodology, guide and regulate the AI development starting from establishing codes of ethics and other soft laws.

For AI development, we should recognize its ability to increase social welfare instead of being blindly optimistic about it or easily giving it up. Therefore, before human society enters the intelligent era, we should, as early as possible, guide AI to progress along the path of science at a macro level, reflect on the ethical problems, and identify the ethical risks and their causes. Efforts shall be made to gradually build a scientific and effective governance system to demonstrate the positive value of AI.

2　Codes of ethics, governance principles and approaches of AI

Since AI governance is still in its early exploratory stage, we are gradually shifting from the formation of the basic consensus of AI codes of ethics to the implementation of credibility evaluation, operating instructions, industrial standards, policies and regulations, and other aspects. The construction of an international AI governance framework is accelerated [7].

2.1　Codes of ethics

In recent years, a number of countries, regions, international and domestic organizations, and enterprises have issued AI codes of ethics or research reports. According to incomplete statistics, more than 40 AI codes of ethics have been released. Except for differences caused by culture, regions, fields, and other factors, a certain social consensus has been formed in current AI codes of ethics.

Relevant institutions and industrial organizations in China have also been actively involved. The followings are some examples. In January 2018, China Electronics Standardization Institute issued the *Artificial Intelligence Standardization White Paper (2018)*, which proposed two basic principles of AI ethics, i.e., the principle of human interests and accountability principle [①] In May 2019, the *Beijing Consensus on Artificial Intelligence* was issued, and 15 principles for a community of shared future for mankind and social development, which should be followed by all participants, were proposed for the AI development, application, and governance [②]. In June 2019, the National Governance Committee for the New Generation Artificial Intelligence issued the *Governance Principles for the New Generation Artificial Intelligence: Developing Responsible Artificial Intelligence*, in which 8 principles of AI development were presented, and the framework and action guide for AI governance were provided [③]. In July 2019, the Shanghai Artificial Intelligence Industry Security Expert Advisory Committee issued the *Initiative for Artificial Intelligence Security Development in Shanghai*[④]. In September 2021, the *Ethical Norms for New Generation Artificial Intelligence* formulated by the National Governance Committee for the New Generation Artificial Intelligence was released on Zhongguancun Forum [⑤]. From the released documents, there is a high degree of consensus on such values as people-oriented, promoting innovation, ensuring security, protecting privacy, and clarifying responsibilities. However, it is still necessary to deepen theoretical research and argumentation to reach further consensus.

2.2　Governance principles

While vigorously developing AI technology and industry, the US, Europe, Japan, and other countries and regions also put a high value on the security and healthy development of AI and include ethical governance into their AI strategies, which reflects the basic principle of attaching equal importance to the development and ethical security.

General Secretary XI put a new premium on legal construction in scientific and technological innovation, and stressed that we should "actively promote the legislation on national security, scientific and technological innovation,

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[①] China Electronics Standardization Institute (compiled), Industrial Standards Department II, Standardization Administration of the People's Republic of China (supervised). Artificial Intelligence Standardization White Paper (2018). (2018-01) [2021-07-15]. http://www.cesi.cn/images/editor/20180124/20180124135528742.pdf.

[②] Beijing Academy of Artificial Intelligence. Beijing Consensus on Artificial Intelligence. (2019-05-25) [2021-07-15]. https://www.baai.ac.cn/news/beijing-ai-principles.html.

[③] National Governance Committee for the New Generation Artificial Intelligence. Governance Principles for the New Generation Artificial Intelligence: Developing Responsible Artificial Intelligence. (2019-06-17) [2021-07-15]. http://www.most.gov.cn/kjbgz/201906/t20190617_147107.html.

[④] Shanghai Artificial Intelligence Industry Security Expert Advisory Committee. Initiative for Artificial Intelligence Security Development in Shanghai. (2019-07-02) [2021-07-15]. http://www.cnr.cn/shanghai/tt/20190702/t20190702_524676955.shtml.

[⑤] National Governance Committee for the New Generation Artificial Intelligence. Ethical Norms for New Generation Artificial Intelligence Released. (2021-09-25) [2021-09-27]. http://kw.beijing.gov.cn/art/2021/9/26/art_8910_613576.html.

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public health, biosafety, ecological civilization, risk prevention, the rule of law concerning foreign affairs, and other key fields, and ensure the sound development of new types of business and new patterns by good laws and governance" [8]. Over the years, China has made an overall policy of "inclusion and prudence" in the regulation and supervision of new technologies and new types of business, which was formally proposed in 2017. This policy is also specifically stipulated in Article 55 of the *Regulations on Optimizing the Business Environment* enforced on January 1, 2020: "The government and related departments should conduct inclusive and prudential regulation over new technologies, new industries, new types of business, new patterns, and other aspects in accordance with the principle of encouraging innovation, formulate and implement corresponding regulation rules and standards in light of their nature and characteristics, and leave enough room for development while ensuring the quality and safety, instead of simply prohibiting or failing to regulate them" [①]. This provides the basic principles and methodology for the current AI ethical governance. On the one hand, we should emphasize observation and recognize that new technologies and new things often possess positive social significance and perfect objective laws. Consequently, we should create space for its development and perfection and formulate regulations and measures where necessary. On the other hand, we should stick to the bottom line, including those for protecting civil rights and security. Important rights, interests, and values included in laws with a high degree of social consensus should be protected in accordance with the law during law enforcement and judicial process. This is not only a legal requirement for relevant technology developers and users but also a commitment to protecting civil rights and interests and promoting technology for social good in the intelligent era.

2.3 Governance approaches

There are two theories in the selection of AI governance, namely "opposition theory" and "system theory" [9].

The "opposition theory" focuses on the conflict between AI technology and human rights and welfare, and then corresponding review and regulation systems are established. In this perspective, some countries and institutions place emphasis on some ethical principles for the AI system and its development and applications. For example, the *Rome Call for AI Ethics* presented 7 principles in 2020, i.e., transparency, inclusion, responsibility, impartiality, reliability, security, and privacy, [②] and the European Commission proposed in the *Ethics Guidelines for Trustworthy AI* issued in 2019 that the AI system should be lawful, ethical, and robust [③] throughout its entire life cycle, which both reflect this approach.

The "system theory" emphasizes the coordination and interaction between AI technology and humans, other artificial agents, laws, non-intelligent infrastructure, and social norms. AI ethics involves a sociotechnical system, which is not an isolated technical object but will operate in a social organization. In addition to the AI system, other elements interacting with the system can also be adjusted. On the basis of understanding the operational characteristics of AI, we can consider how to allocate these elements to achieve the best governance in the whole system. The "system theory" has been reflected in some of the current policies and regulations to some extent. For example, one of the eight principles in the *Ethically Aligned Design* [④] issued by the Institute of Electrical and Electronic Engineers (IEEE) is "competence," which states that the system creator should clarify the requirements for the operator, and the operator should observe the principles of knowledge and skills required for safe and effective operation. This reflects the system theory perspective of making up for the lack of AI from the perspective of user requirements and presents new requirements for education and training in the intelligent era. In the *Governance Principles for the New Generation Artificial Intelligence: Developing Responsible Artificial Intelligence* issued by the National Governance Committee for the New Generation Artificial Intelligence in 2019, China not only emphasizes the ethical principles that the AI system should conform to but also proposes the "governance principles," namely 8 principles to be observed by participants of AI development, from a more systematic perspective. In addition to harmony and human-friendly, respect for privacy, safety and controllability, and other principles for the openness and application of AI, the *Governance Principles* also specifies other important principles, such as "management improvement," "better education and training, support to the vulnerable groups to adapt, and efforts to eliminate the digital divide," "coordinated interactions among international organizations, government agencies, research institutions, educational institutions, industries, social organizations, and the general public in the development and governance of AI." All those reflect the "system theory" and the multi-governing idea,

① Regulations on Optimizing the Business Environment, approved at the 66th executive meeting of the State Council on October 8, 2019, issued by the State Council of the People's Republic of China (No. 722) on October 22, 2019, and enforced on January 1, 2020. (2019-10-22) [2021-07-15]. http://www.gov.cn/zhengce/content/2019-10/23/content_5443963.htm.

② Rome Call for AI Ethics. (2020-02-28) [2021-07-15]. https://www.romecall.org/wp-content/uploads/2021/02/AI-Rome-Call-x-firma_DEF_DEF_con-firme_.pdf.

③ The High-Level Expert Group on Artificial Intelligence. Ethics guidelines for Trustworthy AI. (2019-04-08) [2021-07-15]. https://op.europa.eu/en/publication-detail/-/publication/d3988569-0434-11ea-8c1f-01aa75ed71a1.

④ The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. Ethically Aligned Design. [2021-07-15]. https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead1e.pdf.

including education reform, ethical norms, technical supports, legal regulation, and international cooperation, which provides a more comprehensive AI governance framework and action guide. Based on the particularity and complexity of AI governance, China should systematically deliberate on the AI governance dimensions and built a comprehensive multi-governing AI governance system under the guidance of "the social governance system based on collaboration, participation, and common interests" [10] proposed by General Secretary XI.

3　Countermeasures of AI ethical governance in China

AI ethical governance is an important part of social governance. China should gradually develop a multidimensional and comprehensive governance system participated by multiple subjects under the guidance of "the social governance system based on collaboration, participation, and common interests," taking "inclusion and prudence" as the regulation principles and the "system theory" as the governance approach.

3.1　Education reform

Education is a critical way for intergenerational transmission of knowledge and ability cultivation. According to measures introduced by the State Council and Ministry of Education, and reports released by the United Nations Educational, Scientific and Cultural Organization, such as the *Artificial Intelligence in Education: challenges and opportunities for sustainable development* ① and *Beijing Consensus on Artificial Intelligence and Education* ②, people have begun to emphasize the indispensable role of education development and reform in the development and application of AI technology. To better support AI development and governance, we have to improve the following four aspects. 1) We should improve public awareness through popularizing AI and other cutting-edge technologies to ensure that the public can treat AI rationally. 2) AI ethical education and professional ethical training should be strengthened in scientific workers. 3) Measures should be taken to provide a continuous lifelong education system for workers to deal with the possible unemployment caused by AI. 4) We should study the reform of youth education and break the limitations of knowledge-based education inherited from the industrial era to respond to the demand for talents in the AI era.

3.2　Ethical norms

It is mentioned in the *New Generation Artificial Intelligence Development Plan* that China will "conduct research on AI behavioral science, ethics, and other problems, and build a multi-level judgment structure of ethics and an ethical framework for human-machine collaboration." Meanwhile, we also need to formulate ethics and codes of conduct for developers, designers, and future users of AI products, thereby constraining and guiding them from the source. At present, the work can be carried out from five aspects. 1) In the key fields of AI, we can study the detailed codes of ethics and form operable regulations and suggestions. 2) At the level of publicity and education, AI ethical consensus can be achieved by proper guidance. 3) It is necessary to promote the cognition and practice of scientific institutions and enterprises on AI ethical risks. 4) We can give full play to the role of the ethics committee at the national level and promote the advanced experience in ethical risk assessment and control by various means, such as formulating the codes of ethics and promotion plan of AI at the national level, regularly assessing the ethical risks of new types of business and new application, and regularly selecting the best practice in the AI industry. 5) We can encourage AI research institutes and enterprises to establish ethics committees to lead the AI ethical risk assessment, monitoring, and real-time response and consider AI ethics throughout the whole process of AI design, development, and application [11].

3.3　Technical supports

An important dimension of AI ethical governance is to reduce ethical risks by improving technology. Driven by scientific research, markets, laws, and other factors, a number of scientific research institutions and enterprises have carried out various activities, such as federated learning and privacy computation, in order to better protect personal privacy. Meanwhile, model structures of ethical agents in different fields have also been proposed for AI algorithms to strengthen safety, interpretability, and fairness, and for technical research such as dataset anomaly detection and training sample assessment. It is also essential to improve the patent system, specify the patentability of algorithm-related inventions, and further stimulate technical innovations, so as to support the design of AI systems conforming to ethical requirements [12].

In addition, the formulation of recommended standards in some key fields can not be ignored. In the formulation of AI standards, we should strengthen the implementation and support of AI codes of ethics, and pay attention to the standards for privacy protection, safety, usability, interpretability, traceability, accountability, assessment, regulation support technology, and other aspects. Moreover, enterprises are encouraged to propose and release their own standards and

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① United Nations Educational, Scientific and Cultural Organization. Artificial Intelligence for Sustainable Development: Synthesis Report. (2019) [2021-07-15]. https://unesdoc.unesco.org/ark:/48223/pf0000370308.

② United Nations Educational, Scientific and Cultural Organization. Beijing Consensus on Artificial Intelligence and Education. (2019-03-19) [2021-07-15]. https://unesdoc.unesco.org/ark:/48223/pf0000368303/PDF/368303qaa.pdf.multi.page=52.

actively participate in the development of relevant international standards. Those measures can promote the inclusion of China's patent technologies in the international standards and help China enhance the power of discourse in the development of international codes of ethics and relevant standards of AI, thereby providing a better advantage for Chinese enterprises in the international competition.

3.4 Legal regulation

At the level of legal regulation, we need to gradually develop digital human rights [13], clarify responsibility assignment, build the regulation system, and achieve the organic combination of legal governance and technical governance. At the present stage, it is necessary to effectively implement the *Personal Information Protection Law* and *Data Security Law*, and carry out the legislation in the autonomous driving field. Meanwhile, we should also strengthen research on the algorithm regulation system in key fields, distinguish different scenarios [14], and explore the necessity and preconditions for AI ethical risk assessment, algorithm review, dataset defect detection, algorithm authentication, and other measures, in order to provide theoretical and institutional suggestions for the next legislation.

3.5 International cooperation

Human society is entering the intelligent era, and AI rules and orders are being established. The European Union has conducted many studies on AI values, in hope of translating the tradition of human rights in Europe into the new advantages in AI development by legislation and other means. The US also attaches great importance to AI standards. The executive order of "the American AI Initiative," issued by Trump in February 2019, requires that government agencies such as the Office of Science and Technology Policy (OSTP) and National Institute of Standards and Technology (NIST) should develop standards that guide the development of a reliable, robust, trustworthy, safe, concise, and collaborative AI system and call for the development of international AI standards.

As a leader in AI technology, China should be more proactive in dealing with challenges brought by AI ethical problems and bear corresponding ethical responsibilities in AI development. Moreover, we should actively carry out international exchanges, participate in the formulation of relevant international management policies and standards, and seize the power of discourse in scientific and technological development. Efforts should be made to dominate in the development of the most representative and ground-breaking force in science and technology, contributing to realizing global AI governance.

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